Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of claims:

1. (original) An optical performance monitor for monitoring an optical signal and providing an estimate of a predetermined parameter x of that signal, the optical performance monitor comprising:

a spectrometric transducer element for performing a spectral decomposition of the incident optical signal, and for transforming the decomposed optical signal into a first data set representative of the spectrum of said optical signal;

an auxiliary transducer to receive said optical signal and provide as an output a second data set representative of time-domain parameters of said signal; and

a processor to receive each of said data sets and to apply thereto digital signal processing routines to obtain estimates of said predetermined parameter.

2. (original) A flash optical performance monitor according to claim 1 including a further processor for applying signal reconstruction algorithms to said first data set.

3. (currently amended) An optical performance monitor according to claim 1 wherein ~~the advanced~~ said digital signal processing routines include routines for performing the steps of determining a set of data $\{\tilde{y}_n\}$ representative of said electrical spectral data, and obtaining an estimate $\hat{x}$ of a predetermined parameter x from the set of data $\{\tilde{y}_n\}$, the predetermined parameter x describing a quality of the optical signal received.

4. (original) A flash optical performance monitor according to claim 3 wherein the estimate $\hat{x}$ is determined by a comparison of the set of data $\{\tilde{y}_n\}$ with an ideal set of data.

5. (original) A flash optical performance monitor according to claim 4 wherein the comparison is performed using a processor for computing the estimate $\hat{x}$ from an existing correlation of the predetermined parameter x and the set of data $\{\tilde{y}_n\}$.

6. (original) A flash optical performance monitor according to claim 5 wherein the processor for computing the estimate $\hat{x}$ from an existing correlation of the predetermined parameter x and the set of data $\{\tilde{y}_n\}$ is a neural network.

7. (original) An optical performance monitor according to claim 4wherein the comparison uses reference calibration data, the reference calibration data being structured as $\tilde{D}^{cal} = \{\tilde{x}_\nu^{cal}, \ \{\tilde{y}_{n,\nu}^{cal}\} | \ \nu = 1, 2, \ldots, N^{cal}\}$.

8. (original) An optical performance monitor according to claim 1,

wherein a quality of data transmission by said optical signal is obtained from the spectral quality of that signal.

9. (original) A flash optical performance monitor according to claim 8,

wherein a quality of an optical signal is characterized by the channel power.

10. (original) A flash optical performance monitor according to claim 8,

wherein a quality of an optical signal is characterized by the channel central wavelength.

11. (original) A flash optical performance monitor according to claim 8,

wherein a quality of an optical signal is characterized by the channel optical signal-to-noise ratio.

12. (original) A flash optical performance monitor according to claim 8,

wherein a quality of data transmission is characterized by a quality factor Q.

13. (original) A flash optical performance monitor according to claim 8,

wherein a quality of data transmission is characterized by a bit-error rate BER.

14. (original) A method for monitoring a quality of data transmission of at least one optical channel, the method comprising the steps of:

determining a data set representative of a spectrum of an optical signal transmitted on the at least one optical channel at an instance in time;

obtaining data set from said signal indicative of time domain parameters of said signal;

performing an analysis of said data sets to determine an estimate of a predetermined parameter x of said optical signal.

15. (original) A method for monitoring a quality of data transmission according to claim 14,

wherein said predetermined parameter of said the data transmission describes a bit-error rate BER of the data transmission.

16. (original) A method for monitoring a quality of data transmission according to claim 14,

wherein the quality of the data transmission describes a quality factor Q of the data transmission.

17. (original) A method for monitoring a quality of data transmission according to claim 14,

wherein the step of spectrum analysis to determine a quality of the optical signal comprises the steps of:

performing a spectral decomposition of the optical signal;

determining a set of data $\{\tilde{y}_n\}$ representative of a result of said spectral decomposition; and

obtaining an estimate $\hat{x}$ of a predetermined parameter x, x being either one of BER and Q, from the set of data $\{\tilde{y}_n\}$, the predetermined parameter x describing a quality of the optical signal.

18. (original) A method for monitoring a quality of data transmission according to claim 17;

wherein the estimate $\hat{x}$ is determined by a comparison of the set of data $\{\tilde{y}_n\}$ with an ideal set of data.

19. (original) A method for monitoring a quality of data transmission according to claim 18,

wherein the comparison is performed using a processor for computing the estimate $\hat{x}$ from an identified correlation of the predetermined parameter x and the set of data $\{\tilde{y}_n\}$.

20. (original) A method for monitoring a quality of data transmission according to claim 19,

wherein the processor for computing the estimate $\hat{x}$ from an identified correlation of the predetermined parameter x and the set of data $\{\tilde{y}_n\}$ is a neural network.

21. (original) A method for monitoring a quality of data transmission according to claim 18,

wherein the comparison uses reference calibration data, the reference calibration data being structured as $\tilde{D}^{cal} = \left\{\tilde{x}_\nu^{cal},\ \{\tilde{y}_{n,\nu}^{cal}\} \middle|\ \nu = 1, 2, \ldots, N^{cal}\right\}$.

22. (original) A method for monitoring a quality of data transmission according to claim 14,

wherein the quality of more than one optical channel is monitored by a same process of spectrum analysis.

23. (original) A method for monitoring a quality of data transmission according to claim 15,

wherein the quality factor Q of at least one optical channel is monitored over a period of time, and wherein an indication signal is provided, the indication signal indicative of at least one

optical channel on which the quality factor Q has varied from an acceptable value to an unacceptable value.

24. (original) A method for monitoring a quality of data transmission according to claim 16,

wherein the bit-error rate BER of at least one optical channel is monitored over a period of time, and wherein an indication signal is provided, the indication signal indicative of at least one optical channel on which the bit-error rate BER has varied from an acceptable value to an unacceptable value.

25. (original) A method for monitoring a quality of data transmission according to claim 24,

wherein the indication signal is provided within one second after the bit error rate BER has varied from an acceptable value to an unacceptable value.

26. (original) A method for monitoring a quality of data transmission of at least one optical channel, the method comprising the steps of:

providing a plurality of spectra to a processor for assessing a correlation between said spectra; and

determining from said correlation a quality of data transmission of the at least one optical channel.

27. (original) A method for monitoring a quality of data transmission according to 26,

wherein the quality of the data transmission describes a quality factor Q of the data transmission.

28. (original) A method for monitoring a quality of data transmission according to claim 26,

wherein the quality of the data transmission describes a bit error rate BER of the data transmission.

29. (original) A method for monitoring a quality of data transmission according to claim 26,

wherein the correlation is established by use of a neural network.

30. (original) A method for monitoring a quality of data transmission according to claim 26,

wherein the correlation is established by use of reference calibration data.

31. (original) A method for monitoring a quality of data transmission according to claim 26,

wherein the quality of more than one optical channel is monitored by a same process of correlation.

32. (original) A method for monitoring a quality of data transmission according to claim 27,

wherein the quality factor Q of at least one optical channel is monitored over a period of time, and wherein an indication signal is provided, the indication signal indicative of at least one optical channel on which the quality factor Q has varied from an acceptable value to an unacceptable value.

33. (original) A method for monitoring a quality of data transmission according to claim 32,

wherein the indication signal is provided within one second after the quality factor Q has varied from an acceptable value to an unacceptable value.

34. (original) A method for monitoring a quality of data transmission according to claim 28,

wherein the bit error-rate BER of at least one optical channel is monitored over a period of time, and wherein an indication signal is provided, the indication signal indicative of at least one optical channel on which the bit-error rate BER has varied from an acceptable value to an unacceptable value.

35. (original) A method for monitoring a quality of data transmission according to claim 34,

wherein the indication signal is provided within one second after the bit-error rate BER has varied from an acceptable value to an unacceptable value.

36. (original) A method for estimating a bit-error rate BER of data transmission on at least one optical channel, the method comprising the steps of:

capturing a spectrum of a optical signal transmitted on the at least one optical channel at an instance in time;

performing an analysis of said spectrum to determine a quality of the optical signal; and

estimating from the quality of the optical signal a bit-error rate BER of data transmission,

wherein the bit-error rate BER is estimated absent a summation of bit errors over a period of time sufficient to provide a statistically valid estimate of a bit-error rate BER.

37. (original) A method for estimating a bit-error rate BER according to claim 36,

wherein the instance of time is less than a time period during which a number of bits are transmitted, within which an acceptable bit count will show at least one error.

38. (original) A method for estimating a bit-error rate BER according to claim 36,

wherein the step of spectrum analysis to determine a quality of the optical signal comprises the steps of:

performing a spectral decomposition of the optical signal;

determining a set of data $\{y_n \mid n = 1, \ldots, N\}$ representative of a result of said spectral decomposition; and

obtaining an estimate $\hat{x}$ of a predetermined parameter x from the set of data $\{y_n \mid n = 1, \ldots, N\}$, the predetermined parameter x describing a quality of the optical signal.

39. (original) A method for estimating a bit-error rate BER according to claim 38;

wherein the predetermined parameter x is determined by a comparison of the set of data $\{y_n \mid n = 1, \ldots, N\}$ with an ideal set of data.

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40. (original) A method for estimating a bit-error rate BER according to claim 39,

wherein the comparison is performed using a processor for computing the estimate $\hat{x}$ from an existing correlation of the predetermined parameter x and the set of data $\{\tilde{y}_n \mid n = 1, \ldots, N\}$.

41. (original) A method for estimating a bit-error rate BER according to claim 40,

wherein the correlation processor is a neural network.

42. (original) A method for estimating a bit-error rate BER according to claim 39,

wherein the comparison uses reference calibration data, the reference calibration data being structured as $\tilde{D}^{cal} = \{\tilde{x}_\nu^{cal}, \{\tilde{y}_{n,\nu}^{cal}\} \mid \nu = 1, 2, \ldots, N^{cal}\}$.

43. (original) A method for estimating a bit-error rate BER according to claim 35,

wherein the bit-error rate BER of more than one optical channel is estimated by the same process of spectrum analysis.

44. (original) An optical performance monitor for monitoring an optical signal and providing an estimate of a predetermined parameter x of that signal, the optical performance monitor comprising:

a spectrometric transducer element for performing a spectral decomposition of the incident optical signal, and for transforming the decomposed optical signal into a first data set representative of the spectrum of said optical signal and

a processor to receive said data set, said processor applying thereto digital signal processing routines for signal reconstruction to obtain therefrom estimates of at least one of said predetermined parameters of power, wavelength or optical signal to noise ratio.

45. (original) An optical performance monitor according to claim 44 wherein an estimate of optical power is used to monitor quality of the signal.

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46. (original) An optical performance monitor according to claim 44 wherein optical signal quality is characterised by channel central wavelength.

47. (original) An optical performance monitor according to claim 44 wherein optical signal to noise ratio is used to estimate signal quality.

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